සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது / All Rights Reserved]

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී
இலங்கைப் பரீட்சைத் திணைக்களம்இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka
ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී
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34 E I

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2015 දෙසැම්බර්
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2015 டிசெம்பர்
General Certificate of Education (Ord. Level) Examination, December 2015

විද්‍යාව	I
விஞ்ஞானம்	I
Science	**I**

පැය එකයි
ஒரு மணித்தியாலம்
One hour

Instructions :

(i) *Answer **all** questions.*

(ii) *In each of the questions* **1** *to* **40**, *select the **correct** or **most appropriate** answer from the given alternatives* (1), (2), (3), (4).

(iii) ***In the answer sheet provided, mark a cross** (×) **on the number in the circle corresponding to your choice for each question.***

(iv) *Read the other instructions carefully given on the back of the answer sheet and Follow them.*

1. Which of the following plants is a non-flowering plant with seeds?
(1) Cycas (2) Nephrolepis (3) Paddy (4) Grass

2. Select the answer which correctly gives the scientific name of pea plant, according to the binomial nomenclature.
(1) *Pisum Sativum* (2) Pisum Sativum (3) *Pisum sativum* (4) Pisum sativum

3. Which of the following is a non-living structure of a plant cell?
(1) Chloroplast (2) Cell wall (3) Golgi body (4) Ribosome

4. Number of premolar teeth on both sides of the upper jaw of a healthy adult is
(1) two. (2) four. (3) six. (4) eight.

5. When a bottle of cinnamon oil is opened the smell of cinnamon oil spreads in the air. To which transport method does this belong?
(1) Mass flow (2) Osmosis (3) Evaporation (4) Diffusion

6. Increase of which of the following factors does **not** increase transpiration?
(1) Humidity of air (2) Speed of wind
(3) Temperature of the Environment (4) Light intensity

7. In the human digestive system, which enzyme in the pancreatic juice digests protein?
(1) Trypsin (2) Peptidase (3) Pepsin (4) Lipase

8. The class teacher was unable to attend school for two days due to reddishness of the throat, pain in the throat and loss of voice. What could be the illness that she had?
(1) Asthma (2) Gastritis (3) Tuberculosis (4) Laryngitis

9. A person who does not have any visual defect sees an object clearly in general, when its image is formed,
(1) very close to the lens of the eye.
(2) in between lens of the eye and the retina.
(3) on the retina.
(4) behind the retina.

10. "Both sons born to particular parents are suffering from colour blindness." Which of the following, can **exactly** be said regarding this statement?
(1) Mother is suffering from colour blindness.
(2) Father is suffering from colour blindness.
(3) Either mother or father is suffering from colour blindness.
(4) Both mother and father are suffering from colour blindness.

11. A student observed the specimens *A* and *B* under the compound microscope and identified their tissues as parenchyma and sclerenchyma respectively. Which of the following plant parts would be the specimens *A* and *B* respectively?
(1) a potato, a carrot (2) mid rib of a bitter gourd leaf, a carrot
(3) a potato, a pear fruit (4) a seed of coffee, a pear fruit

[*See page two*

12. "Organisms with more suited genetic variations will live longer." This statement can be explained by the
(1) theory of special creation. (2) theory of spontaneous generation.
(3) theory of use and disuse. (4) theory of natural selection.

13. Which metal is used to galvanise Iron?
(1) Copper (2) Lead (3) Aluminium (4) Zinc

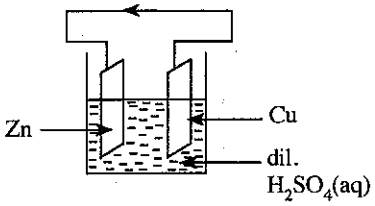
14. In the experiments done in the school laboratory, oxygen gas is collected by the
(1) downward displacement of water. (2) downward displacement of air.
(3) upward displacement of air. (4) upward displacement of water.

15. An element **X** reacts with Cl_2 gas and forms the ionic compound XCl_2. The electronic configuration of **X** could be
(1) 2, 6 (2) 2, 8 (3) 2, 8, 1 (4) 2, 8, 2

16. When a particular gas is bubbled into a colourless aqueous solution, the solution turns milky. The solution and the gas would be
(1) $CuSO_4$ and O_2 (2) $Ca(OH)_2$ and CO_2 (3) $ZnSO_4$ and O_2 (4) $CaCO_3$ and CO_2

- Use the simple voltaic cell in the figure given below to answer the questions No. **17** and **18**.

17. The direction of the arrow in the external circuit shows
(1) the direction of flow of electrons.
(2) the direction of flow of the standard current.
(3) the direction of flow of ions.
(4) the direction of flow of electrons and the standard current.



18. What is the anodic reaction of the cell?
(1) $Cu^{2+}(aq) + 2e \longrightarrow Cu(s)$ (2) $Zn^{2+}(aq) + 2e \longrightarrow Zn(s)$
(3) $Zn(s) \longrightarrow Zn^{2+}(aq) + 2e$ (4) $2H^{+}(aq) + 2e \longrightarrow H_2(g)$

19. Consider the following statements made regarding a certain element.
- Occurs in allotropic forms in nature.
- Has a high melting point.
- It is used in the extraction of metals.

What would this element be?
(1) K (2) Al (3) C (4) S

20. Select the answer which shows the colour of the blue and red litmus papers, when they are dipped in a vinegar solution and in a table salt solution separately.

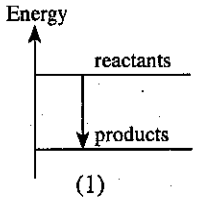
	Litmus paper	Colour in Vinegar solution	Colour in Table salt solution
(1)	Red	Blue	Red
(2)	Blue	Red	Blue
(3)	Red	Red	Blue
(4)	Blue	Blue	Blue

- Consider the following statement and answer the questions No. **21** and **22**.

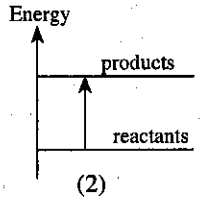
"An amount of heat 1.47 kJ has evolved when 1 g of solid NaOH completely reacted with a solution of dil. HCl."

21. What is the amount of heat evolved when 1 mol of solid NaOH completely reacted with a HCl solution? (Na = 23, O = 16, H =1)
(1) 1.47 kJ (2) 5.88 kJ (3) 58.80 kJ (4) 147.00 kJ

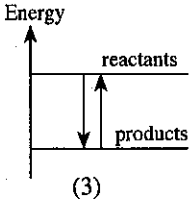
22. What is the correct energy diagram relevant to the reaction mentiond in the statement above?



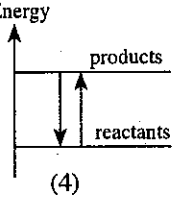
(1)



(2)



(3)



(4)

[See page three

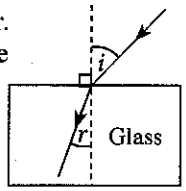
23. Some plants in Hakgala botanical garden in Sri Lanka are grown in a glass house. For plants, this glass house provides
(1) sufficient O_2 gas. (2) suitable temperature. (3) sufficient CO_2 gas. (4) sufficient light.

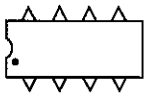
24. A student was able to observe a green coloured layer on the surface of a water body where waste water removed from a vegetable bed gets collected. He made the following statements according to the observation.
A - Excessive amount of inorganic fertilizers have been used highly for the cultivation of vegetables.
B - The green layer is concentrated with algae.
C - BOD value of water in the water body has become low.
Of the above, statements
(1) only *A* and *B* are correct. (2) only *A* and *C* are correct.
(3) only *B* and *C* are correct. (4) all *A*, *B* and *C* are correct.

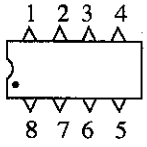
25. The average temperature of the human body is 37 °C. This temperature in the Kelvin scale is
(1) 236. (2) 273. (3) 310. (4) 337.

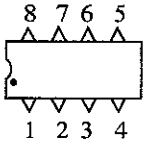
26. Which of the following elements can be doped with a piece of pure Silicon to convert it into an *n*-type semiconductor?
(1) Boron (2) Aluminium (3) Phosporous (4) Germanium

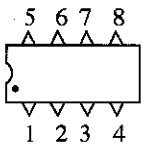
27. As shown in the figure, a ray of light is incident on a block of glass which is kept in air. When the magnitude of the angle of incidence is gradually increased up to 90° the magnitude of the angle of refraction will
(1) increase.
(2) decrease.
(3) increase and then decrease.
(4) not change.

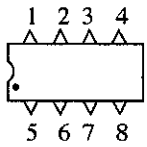


28.  In which of the following ways is the terminals of this integrated circuit numbered correctly?

(1) 

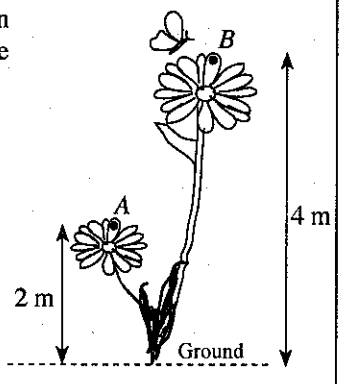
(2) 

(3) 

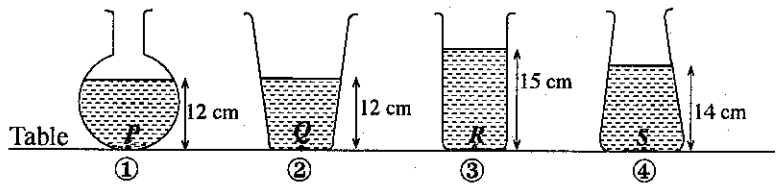
(4) 

29. The volume of gold of a gold chain which was presented by a father to his daughter is said to be 2 cm^3. If the density of that gold is 18 g cm^{-3}, what is the mass of the chain, the daughter received?
(1) 9 g (2) 18 g (3) 27 g (4) 36 g

30. As shown in the figure, a small butterfly of mass 5 g (0.005 kg) flew from a point *A* on one flower to a point *B* on another flower. What is the change in potential energy of the butterfly when it flew from *A* to *B* ? (acceleration due to gravity = 10 m s^{-2})
(1) 0.01 J
(2) 0.10 J
(3) 0.20 J
(4) 0.50 J



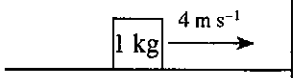
31. Consider the following containers ①,②,③ and ④. The four containers are filled with pure water up to the heights of 12 cm, 12 cm, 15 cm and 14 cm respectively.



P, *Q*, *R* and *S* are points located at the bottom of the containers. Of the points, which point experiences the maximum pressure due to water?
(1) *P* (2) *Q* (3) *R* (4) *S*

[See page four

32. As shown in the figure an object of mass 1 kg moving at a uniform velocity of 4 m s^{-1} subsequently came to rest due to uniform deceleration. If the time that it decelerated is 2 s, select the answer which gives its deceleration and the momentum before the deceleration starts, respectively.



(1) 2 m s^{-2}, 4 kg m s^{-1} (2) 4 m s^{-2}, 2 kg m s^{-1} (3) 8 m s^{-2}, 1 kg m s^{-1} (4) 4 m s^{-2}, 4 kg m s^{-1}

33. Consider the following statements.

A - Pair of scissors is a second order lever.

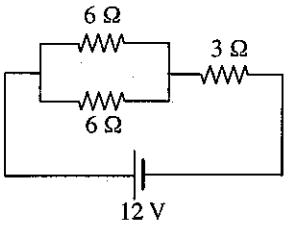
B - Mechanical advantage of a simple machine is given by the ratio $\frac{\text{effort}}{\text{load.}}$.

C - When a work is done with a non-moving single pulley, the velocity ratio of the pulley is 1.

Of the above statements,

(1) only *B* is true. (2) only *C* is true.
(3) only *A* and *C* are true. (4) all *A*, *B* and *C* are true.

34. What is the potential difference between the terminals of the 3 Ω resistor in the given circuit?



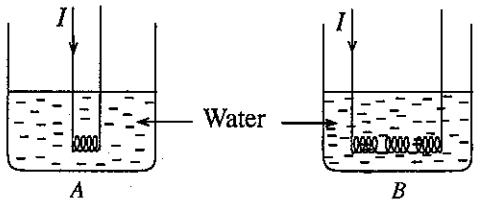
(1) 3 V
(2) 6 V
(3) 9 V
(4) 12 V

35. A child heard the thunder 5 seconds after he saw a flash of lightning. If the speed of sound in air is 330 m s^{-1},what is the distance between the place where the child was and the place where the lightning has occurred?

(1) 1 500 m (2) 1 650 m (3) 2 000 m (4) 2 200 m

36. Two similar beakers *A* and *B* contain similar volumes of water. **One** of four similar nichrome coils is immersed in beaker *A* and the other **three** coils connected in series are immersed in beaker *B* as shown in figures. The same current *I* is passed through the coils for the same period of time as shown in figures. If the increase in temperature of water in *A* and *B* are t_1 and t_2 respectively and there is no heat loss, which of the following is correct with regard to the temperatures?

(1) $t_2 = t_1$
(2) $t_2 = 2t_1$
(3) $t_2 = 3t_1$
(4) $t_2 = \frac{t_1}{3}$



37. The Department of Registration of Persons expects to issue electronic identity cards to citizens in Sri Lanka. This is a result of which of the following technologies?

(1) Information technology (2) Nanotechnology
(3) Molecular biotechnology (4) Genetic engineering technology

38. Consider the following statements.

P – Fulfilling the basic requirements of animals including human
Q – Maintaining the natural cycles like carbon cycle and water cycle
R – Improving the beauty and cultural values of the country

The services of biodiversity in Sri Lanka are

(1) only *P* and *Q*. (2) only *P* and *R*. (3) only *Q* and *R*. (4) all *P*, *Q* and *R*.

39. Which of the following suggestions is most suitable to solve more efficiently and effectively the environmental and social problems that have arisen due to the equipment such as televisions, computers and telephones removed from the rapidly developing world under global village concept?

(1) Minimizing the use of those equipment
(2) Minimizing the amount of those equipment produced
(3) Creating substitutions for those equipment
(4) Taking action to repair those equipment for reuse by the manufacturers themselves

40. What is the theme of world science day in the year 2015?

(1) Science for technology (2) Science for health and well-being
(3) Science for a sustainable future (4) Science for exploration of the universe

* * *

සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது / All Rights Reserved]

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka

34 E II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2015 දෙසැම්බර්
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2015 டிசெம்பர்
General Certificate of Education (Ord. Level) Examination, December 2015

විද්‍යාව	II
விஞ்ஞானம்	II
Science	**II**

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

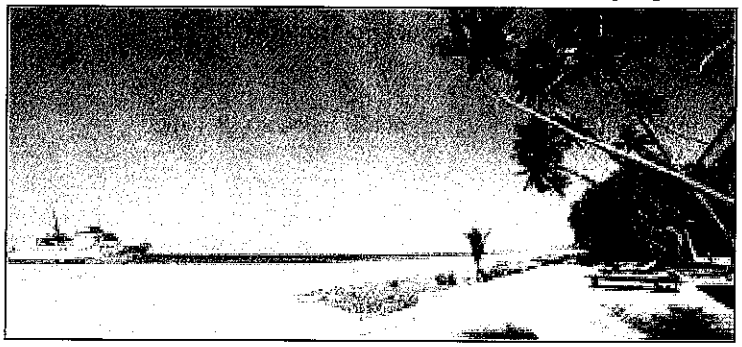
Index Number: .....

Instructions:

- ✲ ***Write your answers in neat handwriting.***
- ✲ *Answer **four** questions in* **Part A**, *in the space provided.*
- ✲ *Answer **three** questions in* **Part B** *selecting **one** question each from the sections* Biology, Chemistry *and* Physics.
- ✲ ***After answering, tie*** **Part A** ***and the answer script of*** **Part B** ***together and hand over.***

Part A - Structured Essay Questions

1. A coastal area of Sri Lanka in the Indian Ocean is given in the following figure.



(i) (a) As shown in the figure, the coconut trees which grow closer to the coast, bend towards the ocean as a result of a particular tropic movement. Identify that tropic movement and write the stimulus relevant to it.

Tropic movement : ..... Stimulus: .....

(b) The animals given in the table live in the Indian ocean and its coastal areas. State the phylum of each of those animals.

Animal	Phylum
Sea anemone	.....
Rag worm	.....

(ii) The valuable mineral Ilmenite is contained in the sand of the ocean.

(a) Out of the coastal areas in Sri Lanka, name an area which has Ilmenite in abundance. .....

(b) Name an industry in Sri Lanka, which uses Ilmenite. .....

(iii) Sodium metal is extracted from sea water. Name the method which is used to extract sodium metal and mention the reason for using that method.

(a) Method: .....

(b) Reason: .....

(iv) Which type of mechanical waves do the small water waves formed on the surface of the ocean belong?

.....

(v) A ship sailing in the Indian ocean is in the figure above.

(a) The mass of the ship is 75 000 kg. When the ship floats in still water of the ocean, what is the upthrust acting on it? (Take the acceleration due to gravity as 10 m s^{-2})

.....

[*See page two*

(b) Items made of iron having a small volume sink in water, but the ships made by the same material float in the ocean. State the reason for this.

.....

.....

(vi) (a) Pollution of ocean and its environment is a major problem faced by our country at present. Mention **two** reasons which influence this environmental pollution.

.....

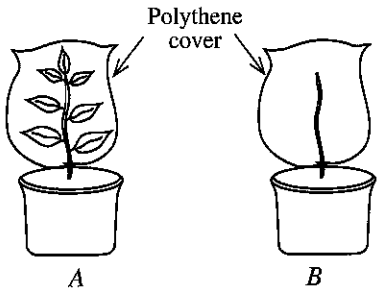
.....

(b) State a suggestion that can be implemented for the conservation of the ocean and its coast.

.....

15

2. (*A*) The two setup *A* and *B* arranged by grade 10 students of a school to demonstrate that transpiration in plants take place mainly by leaves are given here. They kept the two setup in the sun for 5 hours and took down the observations.



(i) Mention the observations which confirms the transpiration takes place mostly from leaves.

.....

.....

(ii) From which structure in the leaves does transpiration mostly take place?

.....

(iii) What is the transpiration which takes place in setup *B* called?

.....

(iv) From the above two setup, what is the setup relevant to the control experiment? .....

(v) After removing the polythene cover in *A* above, upper and lower surfaces of a part of a leaf were covered with two dry cobalt chloride papers. After that, the two cobalt chloride papers were covered with 2 glass slides and tightened with clips and kept for some time.

(a) State the observations made in this situation.

.....

(b) What is the conclusion that could be arrived at through the observation?

.....

(*B*) A group of students who visited Sinharaja forest, prepared a list of plants and animals observed by them. A part of that list is given below.

P - A species of mushroom that grew on a decaying log

Q - Orchid plants with flowers which grew on trees

R - Snails on branches of a tree covered with mosses.

S - A coucal (Atikukula/Shenbagam), perched on a branch of a tree

T - A cobra moving on the ground

(i) How does the mushroom stated in *P,* fulfil its nutrition requirements?

.....

(ii) Mention an adaptation shown by orchid flowers to prevent self pollination.

.....

(iii) (a) By considering the above list, write down a food chain which can exist in the Sinharaja forest.

.....

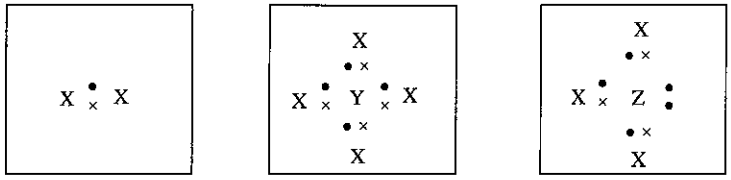
(b) In that food chain, who is the first level consumer? .....

(iv) What is the method of biodiversity conservation, used for the conservation of an ecosystem such as Sinharaja forest, called? .....

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[*See page three*

3. (*A*) The Lewis structures of three molecules which are formed by the atoms X, Y and Z are shown in the following figures (1), (2) and (3). X, Y and Z are **not** standard symbols of the atoms.



(1) (2) (3)

(i) What is the valency of atom Y? .....

(ii) What is the number of the figure which shows a homoatomic molecule? .....

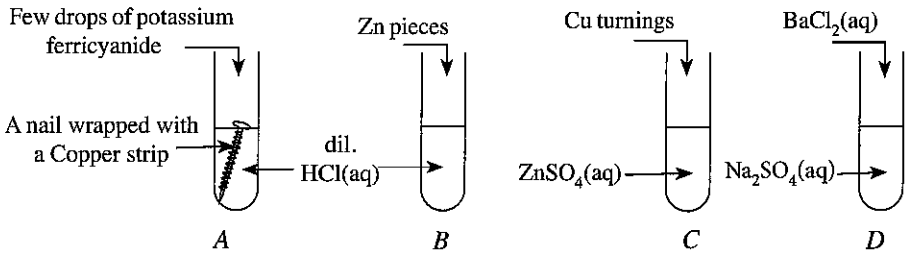
(iii) Write the molecular formula of the molecule shown in figure (3). .....

(iv) What is the type of bonds found in each molecule shown in the figures above? .....

(v) If the atomic numbers of the atoms X, Y and Z are less than 10, identify each atom.

X: ..... Y: ..... Z: .....

(*B*) As shown in the following figures, potassium ferricyanide, Zn pieces, Cu turnings and $BaCl_2(aq)$ are added to the four test tubes *A*, *B*, *C* and *D* respectively, which contain different chemicals.



Considering the chemical reactions which may occur in the test tubes, answer the following questions.

(i) (a) In which test tube can gas bubbles be observed clearly? .....

(b) In which test tube **cannot** a change be observed? .....

(c) In which test tube does a precipitate form? .....

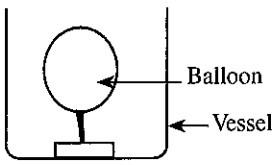
(ii) Write the balanced chemical equation for the reaction that occurs in the test tube *B*.

.....

(iii) Due to the formation of which ions, could an observation be made in the test tube *A*, when few drops of potassium ferricyanide are added?.....

(*C*) An experiment planned by Grade 11 students in a school is given below.

- A balloon filled with a gas, is fixed to the bottom of a vessel as shown in the figure and kept at room temperature. After that, the vessel with the balloon is kept in a refrigerator which is at a temperature of 10 °C.



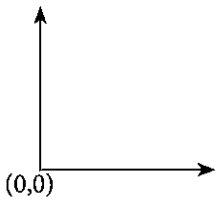
(i) What happens to the volume of the gas in the balloon after keeping it in the refrigerator?

.....

(ii) State the name of the law of gases that can be explained by this experiment.

.....

(iii) According to the experiment, draw the graph relevant to the law of gases mentioned by you in (ii) above, on the axes given. Label the axes.



[See page four

4. (*A*) If each of the following statements is correct, mark (✓) and if it is incorrect, mark (×) in the brackets in front of the statement.

(i) A door can be opened more easily by applying a force perpendicular to the surface of the door very close to the hinge. (.....)

(ii) When an electric current flows through a conductor, a magnetic field is formed around it. (.....)

(*B*) Five activities being performed in a school at a certain time are given below.

Place	Activity
Main Hall	The prefects, decorating the hall using curtains made of thick material.
Library	An office assistant, photocopying pictures using the photo copying machine.
Biology Laboratory	Students, observing the cells of onion tissue using compound microscope.
Home science Laboratory	A labourer, pushing a cupboard placed on the floor by applying a force of 150 N on the cupboard parallel to the floor.
Physics Laboratory	In the science seminar held for grade 11 students, a teacher explaining the way of verifying Ohm's Law with a circuit.

(i) In which place was an activity done with an instrument which uses electrostatic charges?

.....

(ii) Which place has a strategy used to prevent the echo?

.....

(iii) What are the special names used to identify the two convex lenses in the microscope which was used to identify the cells of onion tissue?

(a) lens closest to the onion tissue : .....

(b) lens closest to the eye : .....

(iv) If the frictional force between the floor and the cupboard is 135 N, what was the unbalanced force acting on the cupboard when it was pushing?

.....

(v) (a) With usual notations, draw the standard circuit used by the teacher in the physics laboratory.

(b) When using the circuit drawn in (a) above to verify Ohm's law, the teacher has stated that after taking one reading the switch should be kept open for some time before taking the next reading. What is the reason for making this statement by the teacher?

.....

.....

(*C*) Telephone and computer have become the most popular electrical equipment in the present world.

(i) Name the **two** main parts (two main circuits) of a mobile phone.

.....

(ii) Logical gate circuits are used to perform various activities inside computers. Inside the given box draw the symbol of a 2-input OR gate which is used for such purposes.

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* *

[*See page five*

Part B - Essay Questions

● Answer **three** questions, selecting **one question** each from the sections Biology, Chemistry and Physics.

Biology

5. (*A*) Figures (1) and (2) given below show the underground stems of Ginger and Potato respectively.

(i) State the types of underground stems to which ginger and potato belong respectively.

(ii) Write down a common feature that helps to identify these stems as underground stems.

(iii) By which method of reproduction do these underground stems produce new plants?

(iv) What is the importance of storage of food in these underground stems?

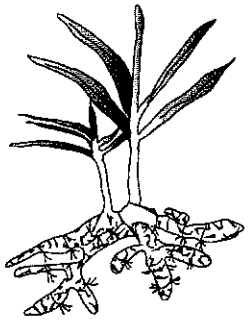


Figure (1)

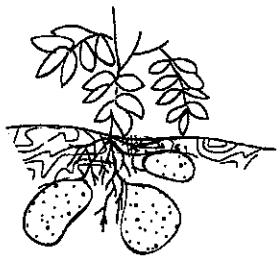


Figure (2)

(*B*) Generating a new organism is an important phenomenon common to the entire living world. Producing organisms that are more suited to the environment, helps to maintain the continuity of life.

(i) Name respectively the male and female gametes which contribute to the process of human reproduction.

(ii) (a) What is the type of cell division that occurs in the formation of gametes which helps to transmit parental characteristics to a child?

(b) State one advantage of that type of cell division.

(iii) During the period of pregnancy blood tests are carried out in maternal clinics and the blood group of the mother is identified.

(a) In an emergency, blood of which groups can be transfused to a mother with blood group B?

(b) In addition to the blood groups, what is the other factor that has to be considered essentially in blood transfusion to prevent blood clotting?

(iv) (a) State the function of progesterone hormone soon after the fertilization.

(b) State the function of oxytosin hormone after a child birth.

6. (*A*) Birds and mammals successfully live in terrestrial, aquatic and aerial environments.

(i) Write **two** features that are common to mammals and birds.

(ii) What is the special shape of the body that the birds have for flying?

(iii) To which organs have the fore limbs of birds modified for flying?

(iv) Birds and mammals are two groups of vertebrates.

(a) Name the other **three** groups that belong to vertebrates except these two groups.

(b) According to the evolutionary evidences, state the group of vertebrates that first came onto the land.

(*B*) Cerebrum, cerebellum, medulla oblongata, thalamus and hypothalamus can be identified as the major parts of the human brain.

(i) From the parts given above, write down the **two** parts that are found at the hind part of the human brain.

(ii) State separately, which part from the four parts given above, performs the following actions.

(a) controlling the memory

(b) controlling of the heart beat

(c) controlling of respiration

(d) coordination of muscle movements

(e) regulation of body temperature

(f) identifying sensation such as vision and hearing

(iii) Reflex actions are made by the organs brain and the spinal cord.

(a) By which organ, is the reflex actions need instant responses made?

(b) State by which organ the following reflex actions are made.

(I) The adjustment of the pupil of the eye as a result of the eye receiving strong and weak light

(II) Taking away of the hand when it comes into contact with something hot

[*See page six*

Chemistry

7. Consider the following chemical reactions.

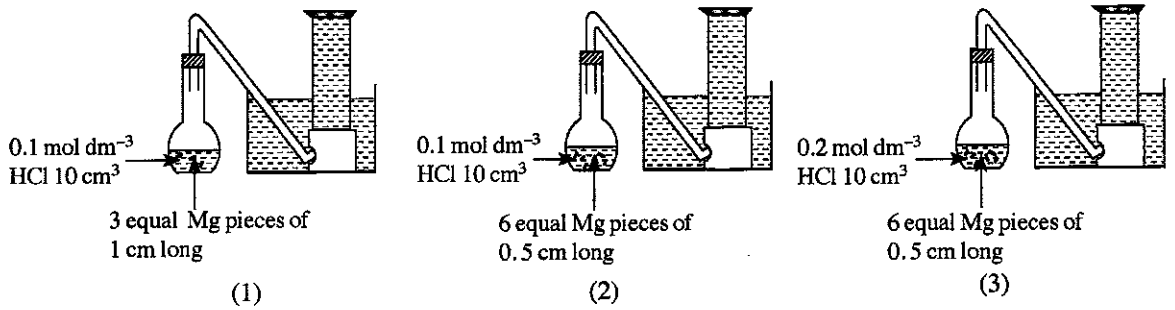
- ❋ Rusting of iron
- ❋ Ripening of fruits
- ❋ Reaction of Mg with diluted HCl acid
- ❋ Toddy turning into vinegar
- ❋ Petrol catching fire

(i) From the above reactions,
(a) write down a reaction that occurs slowly.
(b) write down a reaction that occurs fast.

(ii) (a) Among all the reactions given above, which reaction requires the involvement of micro-organisms?
(b) Write the chemical equation for the reaction you mentioned in (a) above.

(iii) Petrol catching fire is a combustion reaction.
(a) Write down the factors which are required to create a fire.
(b) Name a fire extinguisher which is most suitable to extinguish a petrol fire.
(c) When using the fire extinguisher you mentioned in (b) above, for what reason is the fire extinguished?

(iv) The experimental setup relevant to an experiment for the determination of the factors affecting the rate of a reaction, using Mg and diluted HCl as reactants are given below as (1), (2) and (3). The initial states of the experiment are shown here.



Gases evolved from the reaction during a constant time interval are collected as shown in the setup.

(a) Out of the given three setup, in which setup does the reaction occur at the highest rate?

(b) What factor that affects the rate of a reaction is tested in each of the following pairs of experimental setup?

I. by setup (1) and (2)

II. by setup (2) and (3)

(c) If 2.4 g of Mg is used in the above experiments, calculate the mole amount of Mg used (Mg = 24).

(d) If you don't have any facilities to collect the gas that evolves during this experiment, how would you identify the reaction which occurs at the highest rate?

8. (*A*) (i) A solution of 100 g is prepared by dissolving, a mass of 30 g of solid $MgCl_2$ in pure water at 25 °C.
(a) State the reason for selecting water to prepare the $MgCl_2$ solution.
(b) Calculate the composition of the $MgCl_2$ solution prepared above, as a percentage by mass (w/w).

(ii) (a) A small amount of $MgCl_2$ was deposited at the bottom of the beaker, when another 30 g of $MgCl_2$ was added to the $MgCl_2$ solution prepared in (i) above, stirred well and kept for a short time. What is the special name used to introduce this type of solutions?
(b) The beaker with the solution in (a) above was heated up to a temperature of about 60 °C. State an important observation that could be made here.
(c) Explain the reason relevant to the observation stated in (b) above.

(iii) A student has taken 100 g of water at 20 °C into a beaker. Then this beaker containing water was heated up to a temperature of about 80 °C. He observed the evolution of gas bubbles in this situation.

Explain the reason relevant to the observation made by the student.

[*See page seven*

(*B*) Some steps followed during the construction of a particular house are given below.

* Preparing a concrete mixture
* Placing the concrete mixture on a steel skeleton above the walls
* Applying mortar on the walls
* Colour washing (painting) of the walls

(i) (a) What is the alloy used in the construction of the above house?

(b) State the major component in the alloy.

(ii) In which step has a mixture consisting calcium oxide been used?

(iii) As soon as the concrete mixture was prepared, it should have been placed on the steel skeleton. What is the reason for this?

(iv) Name a heavy metal ion that could be released to the environment when certain kinds of paints are used.

(v) Natural resources are used for the construction of houses and buildings. State **two** environmental damages that would occur when getting these resources from the environment.

Physics

9. Chamod who was frightened when a sudden fire broke out in the house due to an electrical leakage fell-down and hurt his head badly while trying to run away. Chamod was first admitted to a base hospital where he had to undergo various tests including an *X*-ray test. Considering the seriousness of the injury, the doctors decided that he has to undergo an emergency surgery and transferred him by an ambulance to the general hospital.

(i) Due to which property of *X*-rays, are *X*-rays used in the medical field?

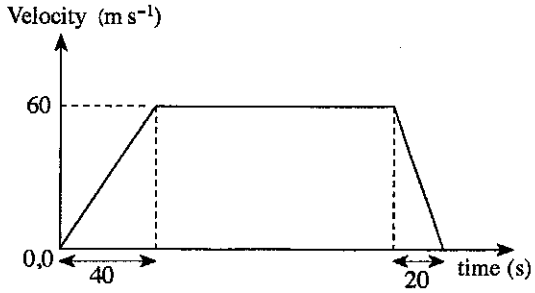
(ii) The driver in the ambulance had to take the patient to the general hospital as soon as possible.

(a) When an ambulance is travelling on the road, drivers who are ahead of the ambulance, identify the special sound produced by the ambulance (sound emitted by the siren) and give way for it. From what characteristic of the sound would the other drivers identify it as an ambulance?

(b) The wavelength of the sound produced by the ambulance above is 0.44 m and the speed of the sound in air is 330 m s^{-1}, calculate the frequency of the sound emitted by the ambulance.

(c) The English word AMBULANCE is written in front of the ambulance as ƎɔИAJUBMA for other drivers ahead to identify it as an ambulance. Explain how other drivers easily identify this word.

(iii) The velocity-time graph relevant to the motion of the above ambulance from the base hospital to the general hospital is given below.
Answer the questions given below using the velocity-time graph or by any other method. (For your calculations, assume that the ambulance has moved in a straight line.)



(a) What is the uniform velocity with which the ambulance has travelled?

(b) If the displacement of the ambulance with uniform velocity is 15 km (15 000 m), find the time that it travelled with uniform velocity.

(c) Find the distance between the two hospitals.

(d) The surgery had to be started within 30 minutes, from the instant the patient has been transferred from the base hospital. If the doctors in the general hospital were ready and other necessities were fulfilled for the surgery, were the doctors able to start the surgery in time? Explain your answer.

(iv) (a) What is the component used in household circuits to prevent electrical shock due to an electrical leakage?

(b) What is the function of the component you have mentioned in (a) above?

(v) State **three** facts that can be included in an article that you are planning to write to the school science magazine on the topic "The safety precautions that can be taken to prevent accidents by electricity at home."

[*See page eight*

10. The Sun emits light and heat in all directions.

(i) (a) By which method of heat transfer, does the heat from Sun reach the Earth?

(b) How does the method you have mentioned in (a) above differ from the other heat transferring methods?

(ii) On a hot sunny day, Sujith came home after school by walking on a tarred road.

(a) When Sujith was walking along the road he saw there appeared to be a pool of water at the far end of the road. Explain briefly the phenomenon seen by him.

(b) The roof of Sujith's house is sheltered with 40 asbestos sheets of 30 kg each. Due to the sun shine the temperature of the sheets increased from 35 °C to 40 °C. (Specific heat capacity of asbestos is 1 050 J kg^{-1} K^{-1})

(I) Calculate the solar heat absorbed by one asbestos sheet.

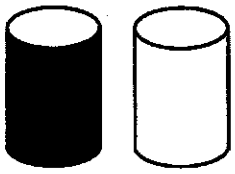
(II) Calculate the total amount of solar heat absorbed by all the sheets.

(c) Sujith has activated a 0.1 kW electric fan for $\frac{1}{2}$ an hour since the house was warm. Calculate the electrical energy consumed by the electric fan.

(d) There were equal volumes of water in two equal cylindrical metal tanks *A* and *B* kept outside the house under the sun. The outer surface of tank *A* was painted with black paint and the outer surface of tank *B* was shiny.

(I) Out of the two tanks, if Sujith wanted to have a bath with lesser warm water, which tank should he select?

(II) Explain briefly the reason for the water in the two tanks to have different temperatures.



A *B*

(iii) Solar cells are used to generate electricity from the energy of sunlight. Solar cells are photodiodes constructed in a special way.

(a) Draw the symbol of a photodiode and mark its positive (+) terminal and negative (–) terminal.

(b) Name a compound that is used to increase the light sensitive property of a photodiode.

(c) What is the optical component in a photodiode used to focus light onto the *p-n* junction.

* * *